

## WHAT IS CLAIMED IS:

1. A gamma correction apparatus for outputting a corresponding pixel voltage according to a pixel signal for a liquid crystal display (LCD), wherein the LCD has a plurality of pixels used to display a plurality of colors, the

5 gamma correction apparatus comprising:

a gray-scale voltage generating circuit, which comprises:

a common gray-scale voltage generating circuit for generating a plurality of common gray-scale voltages; and

a plurality of individual gray-scale voltage generating circuits,  
10 coupled to the common gray-scale voltage generating circuit, each of which generates a plurality of individual gray-scale voltages corresponding to one of the colors, wherein the values of the individual gray-scale voltages generated by each individual gray-scale voltage generating circuit is determined according to what color the individual gray-scale voltage generating circuit  
15 corresponds to; and

a gamma correction circuit, coupled to the gray-scale voltage generating circuit, according to a corresponding color of the pixel signal, for selectively using the common gray-scale voltages and the corresponding individual gray-scale voltages of the corresponding color to determine the  
20 corresponding pixel voltage and outputting the corresponding pixel voltage.

2. A gamma correction apparatus according to claim 1, wherein the common gray-scale voltage generating circuit comprises a series of resistors with a plurality of connecting nodes wherein each of the common gray-scale voltages is generated through a corresponding one of the connecting nodes.

5 3. A gamma correction apparatus according to claim 1, wherein each of the individual gray-scale voltage generating circuits has a plurality of input nodes with each of the input nodes being coupled to a corresponding input voltage source which supplies a corresponding reference voltage to the individual gray-scale voltage generating circuit coupled thereto.

10 4. A gamma correction apparatus according to claim 3, wherein the value of the reference voltage supplied is determined according to the color corresponding to the individual gray-scale voltage generating circuit coupled to the corresponding input voltage source.

15 5. A gamma correction apparatus according to claim 3, wherein the input nodes of each individual gray-scale voltage generating circuit are disposed therein according to the color corresponding to the individual gray-scale voltage generating circuit.

20 6. A gamma correction apparatus according to claim 3, wherein each individual gray-scale voltage generating circuit has a plurality of output nodes for generating the individual gray-scale voltages according to the reference voltages.

7. A gamma correction apparatus according to claim 6, wherein each individual gray-scale voltage generating circuit is a voltage divider with a series of resistors with a plurality of connecting nodes.

8. A gamma correction apparatus according to claim 1, wherein the colors  
5 include red, green and blue colors.

9. A gamma correction apparatus according to claim 8, wherein the individual gray-scale voltage generating circuits are:

a red gray-scale voltage generating circuit for generating a plurality of red gray-scale voltages;

10 a green gray-scale voltage generating circuit for generating a plurality of green gray-scale voltages; and

a blue gray-scale voltage generating circuits for generating a plurality of blue gray-scale voltages;

wherein the gamma correction circuit outputs the pixel voltage  
15 corresponding to the pixel signal according to:

the common gray-scale voltages and the red gray-scale voltages when the pixel signal is used to display the red color;

the common gray-scale voltages and the green gray-scale voltages when the pixel signal is used to display the green color; and

the common gray-scale voltages and the blue gray-scale voltages when the pixel signal is used to display the blue color.

10. A gamma correction apparatus for outputting a corresponding pixel voltage according to a pixel signal for a liquid crystal display (LCD), wherein  
5 the LCD has a plurality of pixels used to display red, green, and blue colors, the gamma correction apparatus comprising:

a gray-scale voltage generating circuit, comprising:

a common gray-scale voltage generating circuit for generating a plurality of common gray-scale voltages;

10 a red individual gray-scale voltage generating circuit coupled to the common gray-scale voltage generating circuit for generating a plurality of red gray-scale voltages;

a green individual gray-scale voltage generating circuit coupled to the common gray-scale voltage generating circuit for generating a plurality  
15 of green gray-scale voltages; and

a blue individual gray-scale voltage generating circuit coupled to the common gray-scale voltage generating circuit for generating a plurality of blue gray-scale voltages; and

a gamma correction circuit coupled to the gray-scale voltage

generating circuit;

wherein the gamma correction circuit outputs the pixel voltage corresponding to the pixel signal according to:

the common gray-scale voltages and the red gray-scale voltages  
5 when the pixel signal is used to display the red color;

the common gray-scale voltages and the green gray-scale  
voltages when the pixel signal is used to display the green color; and

the common gray-scale voltages and the blue gray-scale  
voltages when the pixel signal is used to display the blue color.

10 11. A gamma correction apparatus according to claim 10, wherein:

the red gray-scale voltage generating circuit has a plurality of input  
nodes with each of the input nodes being coupled to a corresponding input  
voltage source which supplies a corresponding reference voltage to the red  
gray-scale voltage generating circuit coupled thereto;

15 the green gray-scale voltage generating circuit has a plurality of input  
nodes with each of the input nodes being coupled to a corresponding input  
voltage source which supplies a corresponding reference voltage to the green  
gray-scale voltage generating circuit coupled thereto; and

the blue gray-scale voltage generating circuit has a plurality of input

nodes with each of the input nodes being coupled to a corresponding input voltage source which supplies a corresponding reference voltage to the blue gray-scale voltage generating circuit coupled thereto.

12. A gamma correction apparatus according to claim 11, wherein the red  
5 gray-scale voltage generating circuit includes a plurality of output nodes for generating the red gray-scale voltages according to the reference voltages thereof; the green gray-scale voltage generating circuit includes a plurality of output nodes for generating the green gray-scale voltages according to the reference voltages thereof; and the blue gray-scale voltage generating circuit  
10 includes a plurality of output nodes for generating the blue gray-scale voltages according to the reference voltages thereof.

13. A gamma correction apparatus according to claim 12, wherein the red gray-scale voltage generating circuit, the green gray-scale voltage generating circuit, and the blue gray-scale voltage generating circuit each include a  
15 series of resistors with a plurality of connecting nodes.

14. A gamma correction apparatus according to claim 13, wherein at least one of the connecting nodes is the input node, at least one of the connecting nodes is the output node, and at least one output node is the input node.

15. A liquid crystal display (LCD), comprising:

20 a plurality of pixels for displaying a plurality of colors; and

a gamma correction apparatus, which outputs a corresponding pixel voltage according to a pixel signal, comprising:

a gray-scale voltage generating circuit, comprising:

a common gray-scale voltage generating circuit for  
5 generating a plurality of common gray-scale voltages; and

a plurality of individual gray-scale voltage generating  
circuits, coupled to the common gray-scale voltage, for generating a plurality  
of individual gray-scale voltages, wherein each individual gray-scale voltage  
generating circuit corresponds to one of the colors, and the values of the  
10 individual gray-scale voltages generating from each individual gray-scale  
voltage generating circuit is determined according to what color the individual  
gray-scale voltage generating circuit corresponds to; and

a gamma correction circuit, coupled to the gray-scale voltage  
generating circuit, according to a color corresponding to the pixel signal, for  
15 selectively using the common gray-scale voltages and the corresponding  
individual gray-scale voltages to determine the corresponding pixel voltage  
and outputting the corresponding pixel voltage.

16. An LCD according to claim 15, wherein the common gray-scale voltage  
generating circuit comprises a series of resistors with a plurality of connecting  
20 nodes wherein each of the common gray-scale voltages is generated through  
one of the connecting nodes.

17. An LCD according to claim 15, wherein each of the individual gray-scale voltage generating circuits has a plurality of input nodes with each of the input nodes being coupled to a corresponding input voltage source which supplies a corresponding reference voltage to the individual gray-scale voltage generating circuit coupled thereto.

18. An LCD according to claim 17, wherein the value of the reference voltage is determined according to the color corresponding to the individual gray-scale voltage generating circuit coupled to the corresponding input voltage source.

19. An LCD according to claim 17, wherein the input nodes of each individual gray-scale voltage generating circuit are disposed therein according to the color corresponding to the individual gray-scale voltage generating circuit.

20. An LCD according to claim 17, wherein each individual gray-scale voltage generating circuit has a plurality of output nodes for generating the individual gray-scale voltages according to the reference voltages.

21. An LCD according to claim 20, wherein each individual gray-scale voltage generating circuit is a series of resistors with a plurality of connecting nodes.

22. An LCD according to claim 15, wherein the colors include red, green, and blue colors.



23. An LCD according to claim 22, wherein the individual gray-scale voltage generating circuits are:

a red gray-scale voltage generating circuit for generating a plurality of red gray-scale voltages;

5 a green gray-scale voltage generating circuit for generating a plurality of green gray-scale voltages; and

a blue gray-scale voltage generating circuits for generating a plurality of blue gray-scale voltages;

10 wherein the gamma correction circuit outputs the pixel voltage corresponding to the pixel signal according to:

the common gray-scale voltages and the red gray-scale voltages when the pixel signal is used to display the red color;

15 the gamma correction circuit outputs the pixel voltage corresponding to the pixel signal according to the common gray-scale voltages and the green gray-scale voltages when the pixel signal is used to display the green color; and

the gamma correction circuit outputs the pixel voltage corresponding to the pixel signal according to the common gray-scale voltages and the blue gray-scale voltages when the pixel signal is used to

display the blue color.

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